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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/849,502	05/03/2001	Ming-Chieh Lee	3382-58659	8696

26119 7590 02/04/2005

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EXAMINER	
CHEN, WENPENG	
ART UNIT	**PAPER NUMBER**
2624	

DATE MAILED: 02/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/849,502	LEE ET AL.	
	Examiner	Art Unit	
	Wenpeng Chen	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 October 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27 and 29-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27, 29-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 October 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Examiner's responses to Applicant's remark

1. Applicants' arguments filed on 10/13/2004 have been fully considered. Applicant's arguments with respect to all the pending claims have been considered but are moot in view of the new ground(s) of rejection due to the amendments. Responses to Applicants' arguments with regard to the amended claims are given below.

2. Applicants' amendments filed on 10/13/2004 overcome the objection to drawings set forth in paper #6.

Claim Objections

3. Claim 31 is objected to because of the following informalities: Claim 31 depends from itself. Appropriate correction is required.

Claim Interpretation

4. For further examination, the Examiner makes the following interpretation.

-- For Claim 31, change "claim 31" in line 1 to "claim 30".

Claim Rejections - 35 USC § 112

5. Claims 1-8, 18-23, and 30-33 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1 and 18 recite "unweighted median filtering" and "unweighted kernel-based filtering", respectively. The Examiner did not find the term "weight" or "unweighted" in the original specification. The Applicants just disclosed using a median filter. Further specified the median filter injects new limitation, thus introduces new matter.

In the letter dated 11/24/2004, the Applicants stated that the term "unweighted median filtering" is supported *inter alia* by description in the application of median filtering without explicit weight parameters or separate weighting acts.

The Examiner disagrees with such a conclusion. If such logic were correct, then Astle (US patent 6,026,190) would implicitly teach using all kinds of low pass filter 303 that would include unweighted median filtering by just disclosing the following:

-- "According to a preferred embodiment, an image signal is received. A strength S of a variable low-pass filter means having a variable strength is selected. The low-pass filter means is applied at strength S to the image signal. The filtered image signal is encoded to provide an encoded bitstream representative of the current image signal." (column 2, lines 34-40)

-- " Filter 303 is a low-pass filter which reduces the high-frequency content of the video image to be encoded, thereby trading quantization artifacts for lack of sharpness." (column 10, lines 49-51)

For Claim 33, the average of two values always involves weighting with 0.5 assigned to each value.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-3, 5-9, 11-16, 18-20, 22-26, and 29-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Astle (US patent 6,026,190 cited previously) in view of Chan et al. (US patent 4,334,244) and Russ ("The Image Processing Handbook," 2nd edition, CRC Press, 1994, pages 164-166 the combination.)

a. For Claims 1-7 and 30-32, Astle teaches, in a computer system with a video encoder, a method for regulating level of a buffer storing compressed video information for the video encoder, the method comprising:

-- determining an indicator value with a level of a buffer for a video encoder; (Fig. 3; column 6, line 1-12)

-- based at least in part upon the indicator value, adjusting low-pass filtering of video information; (Fig. 3; column 6, lines 27-32; *column 10, lines 43-54; column 11, lines 23-28;* Filter 303 is a low-pass filter which reduces the high-frequency content of the video image to be encoded. Filter 303 is a variable low-pass filter whose strength S may be selected by rate controller 306. A higher strength S results in a less sharp image with more high frequency information filtered out of the image to be transformed and quantized. The low-pass filter includes a linear low-pass filter, a non-linear weighted median filter, and other filters listed in

columns 10-11. In the remarks filed on 10/13/2004, the Applicants interpreted that Astle's low-pass filter does not include a median filter. It is wrong interpretation.)

-- wherein the determining and the adjusting occur on a frame-by-frame basis; (column 12, lines 1-24)

-- wherein the low-pass filtering video information includes low-pass filtering intra-coded pixel data; (column 5, lines 60-64; intra-frame encoding)

-- wherein the indicator value is based on at least in part on a perceptual quality measure. (column 6, lines 1-12; The buffer fullness determines a bitrate and quantization level which in the decoding side decide the quality of the recovered image perceived by an user. The buffer fullness is thus a perceptual quality measure.)

For Claim 6, Astle teaches:

-- wherein the low-pass filtering video information includes low-pass filtering a prediction residual. (column 5, lines 45-64; column 12, lines 1-17; A previous frame is utilized to predict how to encode the current frame. Encoding system 100 may utilize a low-pass filter 303 to control the bit rate of the output bitstream representing compressed video frames. An inter-frame encoding includes a prediction residual. The filtering is applied before DCT transform. It is well known in the inter-frame encoding of video coding that a prediction residual is supplied to DCT transform. Therefore, Astle also teaches that low-pass filtering is applied to the prediction residual.)

For Claim 8, Astle also teaches a computer readable medium storing instructions for causing a computer programmed thereby to perform a defined method. (column 4, lines 32-50; host memory 126)

For Claims 13-16, Astle also teaches a computer readable medium storing instructions for causing a computer programmed thereby to perform a method of regulating lossy compression of video information in a video encoder, the method comprising:

-- during lossy compression of a set of video information, intermittently changing a kernel for filtering the set of video information, wherein the kernel defines a neighborhood of values for the filtering, the kernel selected from plural available kernels including at least a first kernel and a second kernel, the first kernel for decreasing quality and bitrate, and the second kernel for preserving quality and increasing bitrate, (a) wherein the changing is based upon a quality constraint for the set of video information, (b) wherein the changing is based upon a bitrate constraint for the set of video information; (Fig. 3; column 6, lines 27-32; column 10, lines 55-65; column 12, lines 18-40; column 11, lines 15; The filter tap ratio defines the kernel.)

-- using the kernel to filter the set of video information. (column 5, lines 60-64)

For Claims 18-20 and 22-23, Astle also teaches a computer readable medium (host memory 126) storing instructions for causing a computer programmed thereby to perform a method of controlling bitrate of information in an encoder, the method comprising:

-- receiving a bitrate indicator for filtering a set of information, the received bitrate indicator indicating a bitrate goal for the set of information, the bitrate indicator based upon level of a buffer; (Fig. 3; column 6, line 1-12)

-- based upon the received bitrate indicator, adjusting kernel-based filtering of the set of information, wherein a kernel defines a neighborhood of values for the kernel-based filtering, wherein the filtering is low-pass filtering, (a) wherein the adjusting comprises changing the kernel based upon the received bitrate indicator; (column 10, lines 43-54; Fig. 3; column 6, lines 27-32; column 12, lines 18-40; column 11, lines 15)

-- wherein the set of information is for a video sequence, and wherein the receiving and the adjusting occur for each new set of information for the video sequence. (column 12, lines 1-24)

-- wherein the filtering set of information includes filtering a prediction residual. (See the explanation above.)

For Claim 24-26 and 29, Astle also teaches, in a computer system, an encoder with a bitrate adaptive filter for filtering information, the encoder comprising:

-- a bitrate adaptive filter for filtering information, wherein the bitrate adaptive filter is a bitrate adaptive low pass filter; (Fig. 3; column 6, lines 27-32; column 10, lines 43-54)

-- a frequency transformer for transforming filtered information into the frequency domain; (column 5, lines 45-64; DCT)

-- a quantizer for quantizing frequency transformed information, wherein the quantizer is a bitrate adaptive quantizer; (column 5, line 45 to column 6, line 12)

-- an entropy coder for entropy coding quantized information; (column 5, lines 45-64; run-length coding)

-- a buffer for buffering entropy coded information, wherein the bitrate adaptive filter adjusts filtering in relation to level of the buffer; (Fig. 3; column 6, lines 1-12, 27-32; column 10, lines 55-65)

-- wherein filtering the information includes filtering intra-coded pixel data and a prediction residual. (column 5, lines 60-64; column 5, lines 60-64; intra-frame encoding; An inter-frame encoding includes a prediction residual. See the above explanation.)

Although Astle teaches "changing the strength of low-pass filtering based upon an indicator value with a level of a buffer", it does not teach explicitly the feature related to (1) "unweighted median filtering," (2) "changing the kernel of median filtering based upon the indicator value of the buffer," and (3) "kernel shape."

Chen teaches that the strength of a median filter depends on the size and shape of the median filter. (column 5, lines 65 to column 6, line 1)

Russ teaches unweighted median filters with various kernel size and shape, wherein the median filtering includes: sorting n input values, wherein n is an odd number greater than 2;

and selecting an output value that is the middle value of the sorted input values. (Fig. 11, page 165; The filtering, which is disclosed without explicit weight parameters or separate weighting acts, is thus unweighted median filtering. As also evident in Fig. 10, page 164 of Russ, the strength of filter (c) having 21 pixels of Fig. 11 is larger than that of filter (b) having 9 pixels of Fig. 11, because Fig. 10(d) corresponding to filter (c) had less noise dots than Fig. 10(c) corresponding to filter (b). Of course, both noises of Figs. 10(c) and 10(d) are smaller than that of Fig. 10(b) which corresponds to case without any filtering.)

It is desirable to have flexibility to select various low-pass filtering with adjustable strength. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply the combined teaching of Chan and Russ to add Russ's approach to include "unweighted median filtering in which the kernel of median filtering is changed in size and shape" as additional low-pass filtering in Astle's method, because the combination of Astle, Chan and Russ provides flexibility in bit rate control. (*The Applicants argued that because Astle is for rate control. While Russ is for noise reduction, one of ordinary skill in the art would not combine them. The Examiner disagrees. As pointed out above, Astle teaches the very fundamental concept of rate control with adjusting filtering strength prior encoding. Rust is combined to teach additional way of adjusting filter strength. Chan's teaching makes it clearer that Rust's median filters have different strengths. One of ordinary skill in the art would combine them with the Examiner's stated motivation.*)

Because the five median filters of Fig. 11 of Russ are discrete, it would have been obvious to one of ordinary skill in the art, at the time of the invention that each filter represents a discrete range of strength of filtering. Once the strength of filtering for bit rate control is determined in Astle, the type of filter (or no filtering) will be selected from Fig. 11 of Russ. Therefore, the combination teaches:

-- based at least in part upon the indicator value, adjusting unweighted median filtering of video information;

-- wherein a kernel defines a neighborhood of values for the median filtering, and wherein the adjusting comprises changing the kernel based at least in part upon the indicator value;

-- wherein the changing comprises: if the indicator value is within a first range, selecting a first kernel; and if the indicator value is within a second range, selecting a second kernel;

-- wherein the median filtering video information includes median filtering intra-coded pixel data;

-- wherein the median filtering video information includes median filtering a prediction residual;

-- during lossy compression of a set of video information, intermittently changing a kernel for filtering the set of video information, wherein the kernel defines a neighborhood of values for the filtering, the kernel selected from plural available kernels including at least a first kernel with a first kernel shape and a second kernel with a second kernel shape different than the first kernel shape, the first kernel for decreasing quality and bitrate, and the second kernel for preserving quality and increasing bitrate;

-- wherein a kernel defines a neighborhood of values for the bitrate adaptive filter, and wherein the bitrate adaptive filter adjusts filtering by changing shape of the kernel.

For Claim 8 the combination of Astle, Chan and Russ thus teaches a computer readable medium storing instructions for causing a computer programmed thereby to perform the method of claim 1.

Because Astle also teaches a video encoder with bit rate control, the teachings of the combination of Astle, Chan, and Russ as discussed above evidently teach all features recited in Claims 9 and 11-12.

8. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (pages 2-3) in view of the combination of Astle, Chan and Russ.

The admitted prior art teaches an encoder for bit rate control wherein the information is for plural frames of a video sequence, and wherein the encoder drops information for one or more of the plural frames when the buffer approaches fullness. (page 2, line 16 to page 3, line 2)

However, the admitted prior art dose not teaches the features of the parent Claim 26 of Claim 27.

As discussed above, the combination of Astle, Chan and Russ teaches all the features recited for Claim 26.

It is desirable to maintain quality of a video as much as possible. One way to achieve this object is to minimize the number of dropped frames. With the bit rate control based on adaptive filtering, there is less chance the buffer will be full. As a consequence, there will be fewer frames to be dropped. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply the bit rate control taught by the combination of Astle, Chan and Russ to the encoder of the admitted prior art to further control the generated bits, because the combination maintains better quality of a video.

9. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (pages 2-3) in view of the combination of Astle, Chan and Russ.

The admitted prior art teaches an encoder for bit rate control wherein the information is for plural frames of a video sequence, and wherein the encoder drops information for one or more of the plural frames when the buffer approaches fullness. (page 2, line 16 to page 3, line 2)

However, the admitted prior art dose not teaches the features of the parent Claim 9 of Claim 10.

As discussed above, the combination of Astle, Chan and Russ teaches all the features recited for Claim 9.

It is desirable to maintain quality of a video as much as possible. One way to achieve this object is to minimize the number of dropped frames. With the bit rate control based on adaptive filtering, there is less chance the buffer will be full. As a consequence, there will be fewer frames to be dropped. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply bit rate control taught by the combination of Astle, Chan and Russ to the encoder of the admitted prior art to further control the generated bits, because the overall combination maintains better quality of a video.

10. Claims 4 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Astle, Chan and Russ in view of Fukuda (US patent 5,625,714 cited previously.)

The combination of Astle, Chan and Russ as discussed above teaches the parental Claims 1 and 18. Although the combination teaches "changing the strength of median filtering based upon the determined level of the buffer", it does not teach the feature related to " the adjusting comprises changing a number of times for the median filtering of the video information."

Fukuda teaches "adjusting the strength of an overall median filtering with changing a number of times for small-size median filtering." (column 18, lines 1-21)

It is desirable to have flexibility to select various ways for adjusting the strength of median filters. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to add Fukuda's approach to change times of small-size median filtering as a way for

changing the strength of an overall median filtering taught by the combination of Astle, Chan and Russ, because the combination provides flexibility in bit rate control.

11. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Astle, Chan and Russ in view of Sun et al. (US patent 5,969,764 cited previously.)

The combination of Astle, Chan and Russ as discussed above teaches the parental Claim 13. However, it does not teach the feature related to video object.

Sun teaches coding video objects. (column 4, lines 24-51; VO)

It is desirable to extend rate control to various kinds of image compression. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply the bit rate control approach taught by the combination of Astle, Chan and Russ to control bit rate of coding video objects taught by Sun, because the combination extend Astle's application to compression using video objects. The advantages of using Astle's approach are discussed in columns 1-2 of Astle.

12. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Astle, Chan and Russ in view of Mori et al. (US 6,556,925.)

The combination of Astle, Chan and Russ as discussed above teaches the parental Claim 1. However, it does not teach the feature related to the median filter with an even number of input values.

Mori teaches median filtering with odd and even numbers of values,

-- wherein the median filtering includes: sorting n input values, wherein n is an odd number greater than 2; and selecting an output value that is the middle value of the sorted input values. (column 9, line 66 to column 10, line 5)

It is desirable to extend rate control for various kinds of median filters including those of even values. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to add even-number median filters to as one approach for the bit rate control taught by the combination of Astle, Chan and Russ, because the combination broadens the application of the method taught by the combination.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wenpeng Chen whose telephone number is 703 306-2796. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K Moore can be reached on 703 308-7452. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9306 for After Final communications. TC 2600's customer service number is 703-306-0377.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 305-4700.

Wenpeng Chen
Examiner
Art Unit 2624

February 1, 2005